

What is Claimed is:

- 1 1. An apparatus for managing and transporting virtual disks over a network to  
2 networked stations comprises a data storage subsystem and at least one data processor  
3 connected thereto via a network, said data processor includes a virtual disk interface  
4 controller to interface with said storage subsystem in handling the input and output  
5 for said storage subsystem, and said storage subsystem manages a pool of storage  
6 blocks in the form of a plurality of virtual disk images and transports the virtual disk  
7 images over the network to said virtual disk interface controller, wherein each virtual  
8 disk image transported via the network is emulated as a virtual disk by said virtual  
9 disk interface controller and presented to said data processor.
- 1 2. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 1, wherein said storage subsystem further  
3 comprises a virtual disk image manager, a plurality of data storage devices, and a  
4 virtual disk image transporter, each data storage device contains data blocks that are  
5 constructed into a plurality of virtual disk images by said virtual disk image manager  
6 under the instruction from a user interface, said virtual disk image transporter  
7 accesses a data storage device for said data blocks comprising the selected virtual  
8 disk image via a map maintained by said virtual disk image manager and  
9 communicates with said virtual disk interface controller via the network.
- 1 3. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 1, wherein said data processor further includes  
3 a disk interface, a virtual disk emulated by said virtual disk interface controller is  
4 presented to said data processor via a disk interface bus to said disk interface as

5 response to said data processor.

1 4. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 1, said virtual disk interface controller further  
3 comprising:

4 a data storage device interface for capturing and interpreting the data access requests  
5 via a disk interface bus, then converting the interpreted requests for sending back to  
6 said data processor; and

7 a network interface for conducting data storage interfacing via the network with said  
8 data storage subsystem.

1 5. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 4, said data storage device interface further  
3 comprising:

4 a storage interface capturing and conversion unit for capturing storage interface  
5 commands via the disk interface bus for translation, and the results coming back from  
6 said data storage subsystem being converted for sending back to said data processor;  
7 and

8 a storage interface translation unit for translating captured storage interface  
9 commands into a storage interface format, and the translated commands being sent  
10 via said network interface over the network to said data storage subsystem where data  
11 storage accesses take place physically.

1 6. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 2, wherein each virtual disk image comprises

3 a set of sequentially numbered blocks of data storage of predetermined fixed size.

1 7. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 2, wherein said data storage subsystem further  
3 includes a cache memory for storing most recently used blocks for said data processor.

1 8. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 2, wherein said data storage subsystem further  
3 includes a selection unit to select one of said virtual disk images via the map  
4 maintained by said virtual disk image manager.

1 9. The apparatus for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 1, wherein said apparatus is to operate within  
3 and on a computer system comprising the hardware components of at least one main  
4 processor and at least one storage device.

1 10. A data processor for managing and transporting virtual disks over a network to  
2 networked stations, comprising:

3 a virtual disk interface controller to interface with a storage subsystem having a  
4 plurality of virtual disk images in handling the input and output for the storage  
5 subsystem; and

6 a disk interface, a virtual disk image emulated by said virtual disk interface controller  
7 is presented to said data processor via a disk interface bus to said disk interface as  
8 response to said data processor.

1 11. The data processor for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 10, said virtual disk interface controller

3 further comprising:

4 a data storage device interface for capturing and interpreting the data access requests  
5 via said disk interface bus, then converting the interpreted requests for sending back  
6 to said data processor; and

7 a network interface for conducting data storage interfacing via the network with the  
8 data storage subsystem.

1 12. The data processor for managing and transporting virtual disks over a network to  
2 networked stations as claimed in claim 11, said data storage device interface further  
3 comprising:

4 a storage interface capturing and conversion unit for capturing storage interface  
5 commands via the disk interface bus for translation, and the results coming back from  
6 the data storage subsystem being converted for sending back to said data processor;  
7 and

8 a storage interface translation unit for translating captured storage interface  
9 commands into a storage interface format, and the translated commands being sent  
10 via said network interface over the network to the data storage subsystem where data  
11 storage accesses take place physically.

1 13. A method for managing and transporting virtual disks over a network to networked  
2 stations, comprising the steps of: (a) managing a pool of possibly scattered and shared  
3 storage blocks in the form of a plurality of virtual disk images, (b) transporting  
4 selected virtual disk images over the network to a plurality of connected diskless  
5 computers and (c) seamlessly emulating the transported virtual disk image as a disk

6 image to the computer that requests access to the virtual disk image.

1 14. The method for managing and transporting virtual disks over a network to networked  
2 stations as claimed in claim 13, wherein the step (a) further comprises the steps of:

3 (a1) creating said plurality of virtual disk images in block format, each virtual disk  
4 image comprising a set of sequentially numbered blocks of data storage of  
5 predetermined fixed size; and

6 (a2) accessing data blocks of selected virtual disk from said virtual disk images via a  
7 map maintained by a virtual disk image manager.

1 15. The method for managing and transporting virtual disks over a network to networked  
2 stations as claimed in claim 13, wherein a disk image in the step (c) is transparently  
3 subject to local hard disk manipulation utilities for making partitions, creating file  
4 system or configuring for bootstrapping.

1 16. The method for managing and transporting virtual disks over a network to networked  
2 stations as claimed in claim 13, wherein each emulation unit in the step (c) performs  
3 the function of a disk emulator that serves as a local disk device to its host computer,  
4 and the communication between a disk emulation adaptor and a disk image server is  
5 via a network protocol for transporting packets that encapsulate disk access requests  
6 and results.